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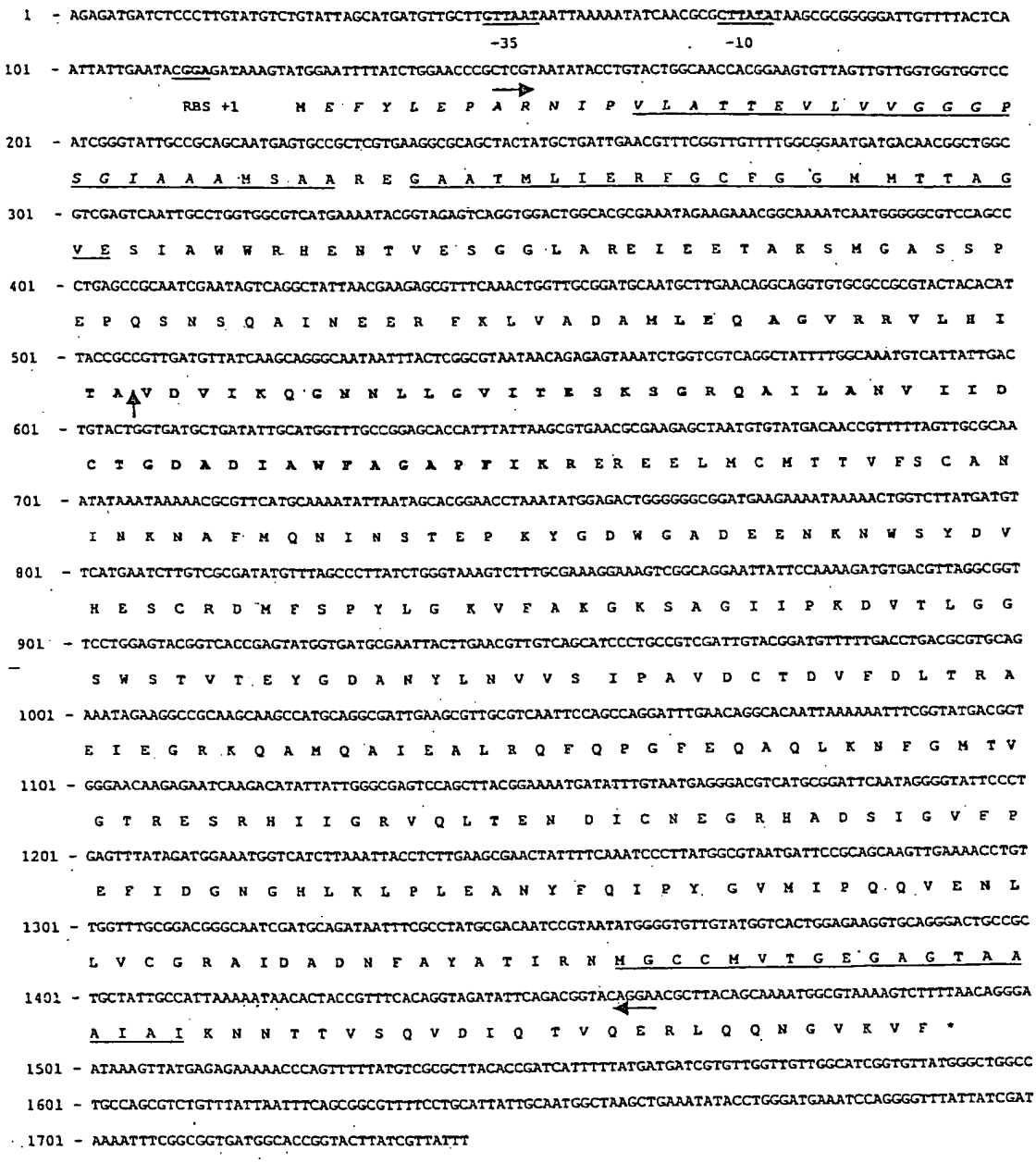
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-35
-10
101 - ATTATTGAATACGGAGATAAAGTATGGAATTTTATCTGGAACCCGCTCGTAATATACCTGTACTGGCAACCACGGAAGTGTTAGTTGTTGGTGGTGGTCC
RBS +1 M E F Y L E P A R N I P V L A T T E V L V V G G G P
201 - ATCGGGTATTGCCGCAGCAATGAGTGCCGCTCGTGAAGGCGCAGCTACTATGCTGATTGAACGTTTCGGTTGTTTTGGCGGAATGATGACAACGGCTGGC
S G I A A A M S A A R E G A A T M L I E R F G C F G G M M T T A G
301 - GTCGAGTCAATTGCCTGGTGGCGTCATGAAAATACGGTAGAGTCAGGTGGACTGGCACGCGAAATAGAAGAAACGGCAAAATCAATGGGGGCGTCCAGCC
V E S I A W W R H E N T V E S G G L A R E I E E T A K S M G A S S P
401 - CTGAGCCGCAATCGAATAGTCAGGCTATTAACGAAGAGCGTTTCAAACTGGTTGCGGATGCAATGCTTGAACAGGCAGGTGTGCGCCGCGTACTACACAT
E P Q S N S Q A I N E E R F K L V A D A M L E Q A G V R R V L H I
501 - TACCGCCGTTGATGTTATCAAGCAGGGCAATAATTTACTCGGCGTAATAACAGAGAGTAAATCTGGTCGTCAGGCTATTTTGGCAAATGTCATTATTGAC
T A V D V I K Q G N N L L G V I T E S K S G R Q A I L A N V I I D
601 - TGTACTGGTGATGCTGATATTGCATGGTTTGCCGGAGCACCATTTATTAAGCGTGAACGCGAAGAGCTAATGTGTATGACAACCGTTTTTAGTTGCGCAA
C T G D A D I A W F A G A P F I K R E R E E L M C M T T V F S C A N
701 - ATATAAATAAAAACGCGTTCATGCAAAATATTAATAGCACGGAACCTAAATATGGAGACTGGGGGGCGGATGAAGAAAATAAAAACTGGTCTTATGATGT
I N K N A F M Q N I N S T E P K Y G D W G A D E E N K N W S Y D V
801 - TCATGAATCTTGTCGCGATATGTTTAGCCCTTATCTGGGTAAAGTCTTTGCGAAAGGAAAGTCGGCAGGAATTATTCCAAAAGATGTGACGTTAGGCGGT
H E S C R D M F S P Y L G K V F A K G K S A G I I P K D V T L G G
901 - TCCTGGAGTACGGTCACCGAGTATGGTGATGCGAATTACTTGAACGTTGTCAGCATCCCTGCCGTCGATTGTACGGATGTTTTTGACCTGACGCGTGCAG
S W S T V T E Y G D A N Y L N V V S I P A V D C T D V F D L T R A
1001 - AAATAGAAGGCCGCAAGCAAGCCATGCAGGCGATTGAAGCGTTGCGTCAATTCCAGCCAGGATTTGAACAGGCACAATTAAAAAATTTCGGTATGACGGT
E I E G R K Q A M Q A I E A L R Q F Q P G F E Q A Q L K N F G M T V
1101 - GGGAACAAGAGAATCAAGACATATTATTGGGCGAGTCCAGCTTACGGAAAATGATATTTGTAATGAGGGACGTCATGCGGATTCAATAGGGGTATTCCCT
G T R E S R H I I G R V Q L T E N D I C N E G R H A D S I G V F P
1201 - GAGTTTATAGATGGAAATGGTCATCTTAAATTACCTCTTGAAGCGAACTATTTTCAAATCCCTTATGGCGTAATGATTCCGCAGCAAGTTGAAAACCTGT
E F I D G N G H L K L P L E A N Y F Q I P Y G V M I P Q Q V E N L
1301 - TGGTTTGCGGACGGGCAATCGATGCAGATAATTTCGCCTATGCGACAATCCGTAATATGGGGTGTTGTATGGTCACTGGAGAAGGTGCAGGGACTGCCGC
L V C G R A I D A D N F A Y A T I R N M G C C M V T G E G A G T A A
1401 - TGCTATTGCCATTAAAAATAACACTACCGTTTCACAGGTAGATATTCAGACGGTACAGGAACGCTTACAGCAAAATGGCGTAAAAGTCTTTTAACAGGGA
A I A I K N N T T V S Q V D I Q T V Q E R L Q Q N G V K V F *
1501 - ATAAAGTTATGAGAGAAAAACCCAGTTTTTATGTCGCGCTTACACCGATCATTTTTATGATGATCGTGTTGGTTGTTGGCATCGGTGTTATGGGCTGGCC
1601 - TGCCAGCGTCTGTTTATTAATTTCAGCGGCGTTTTCCTGCATTATTGCAATGGCTAAGCTGAAATATACCTGGGATGAAATCCAGGGGTTTATTATCGAT
1701 - AAAATTTCGGCGGTGATGGCACCGGTACTTATCGTTATTT

FIGURE 1

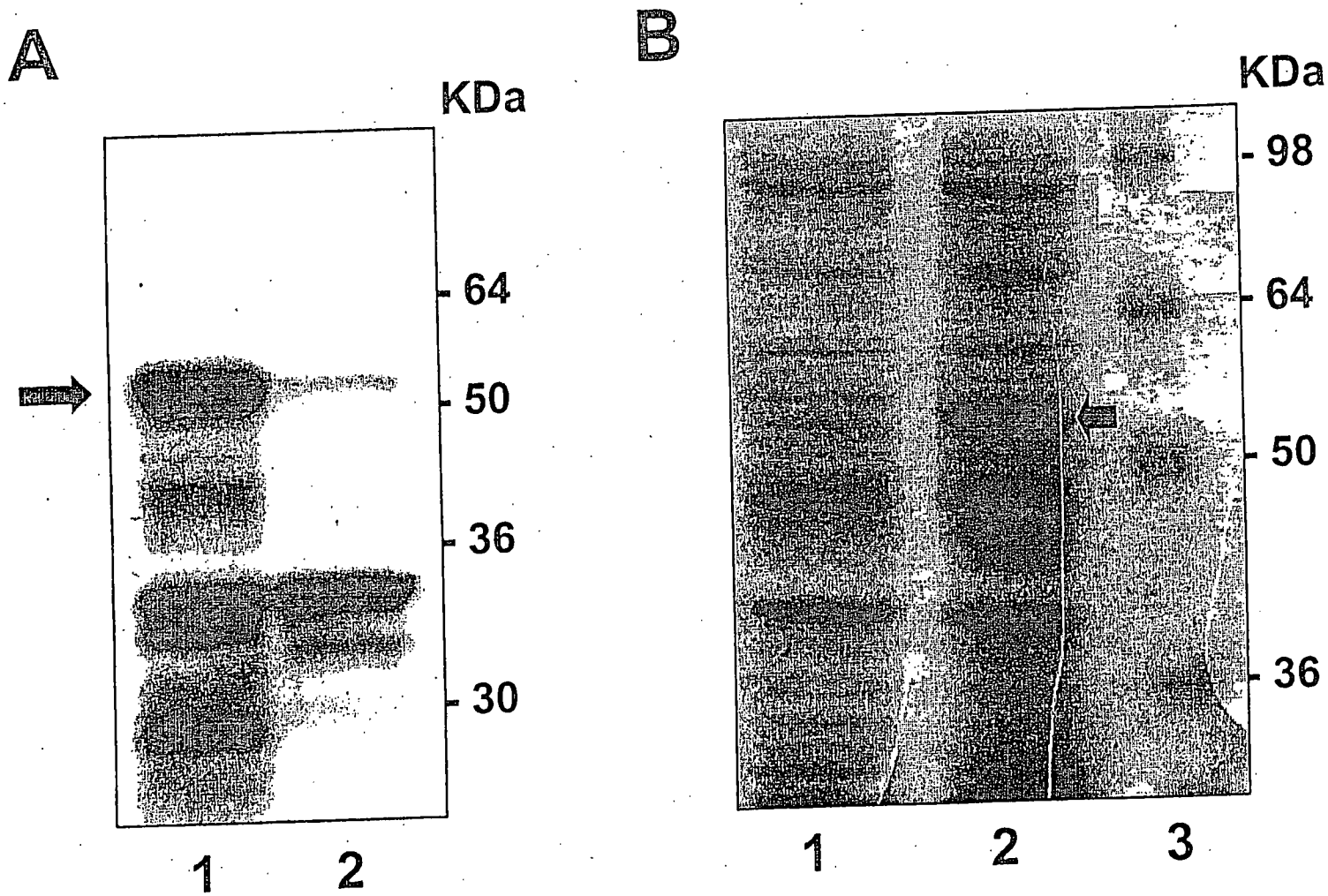


FIGURE 2

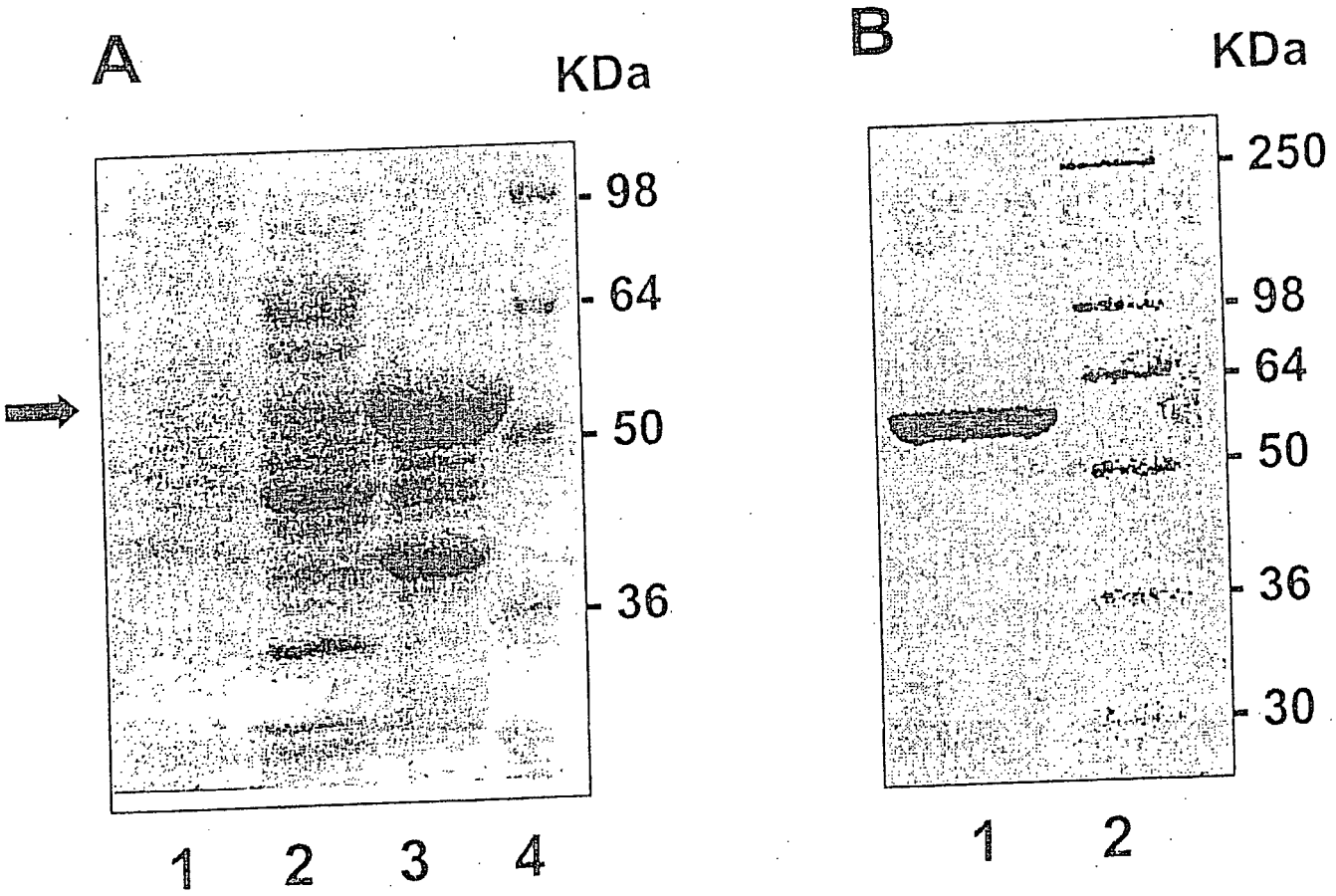


FIGURE 3

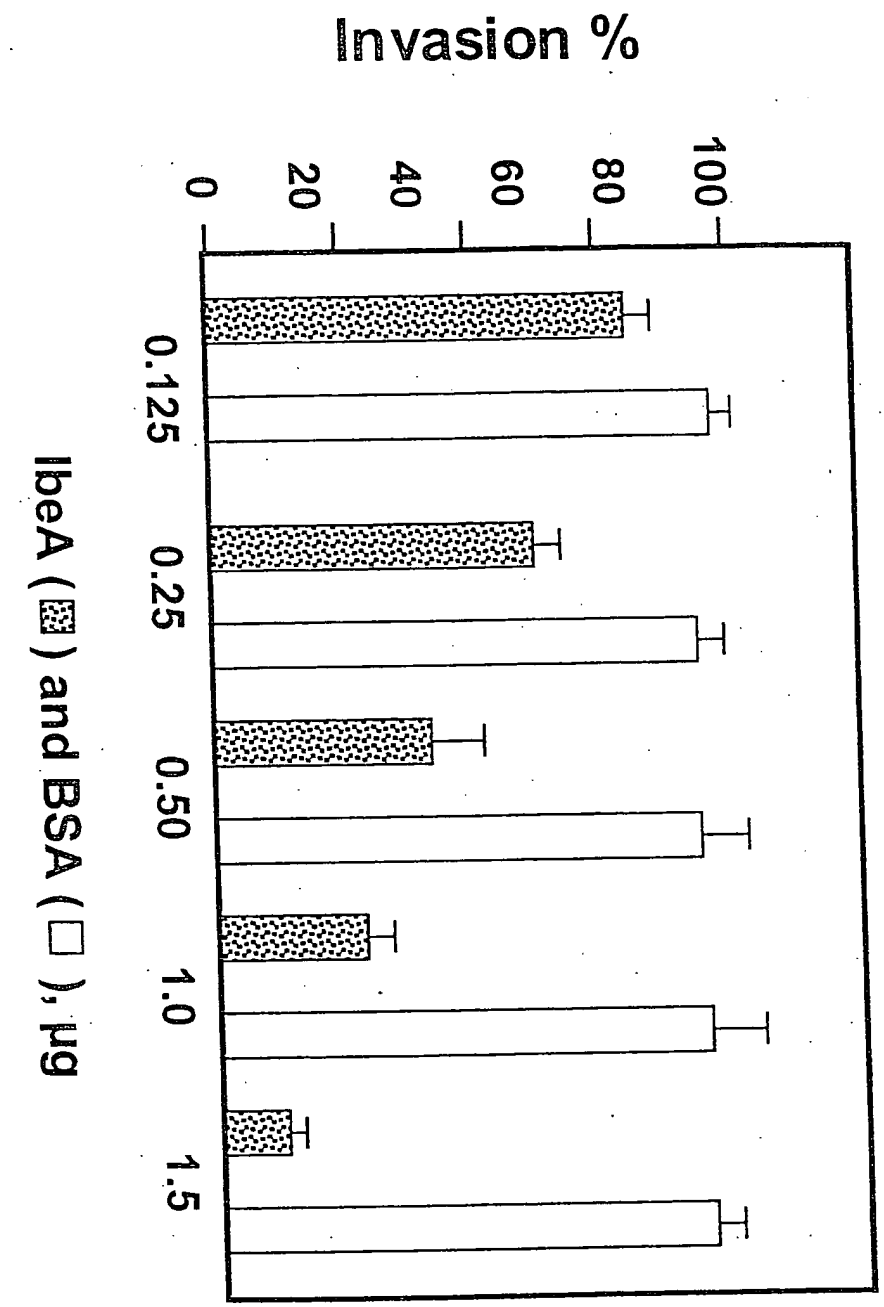


FIGURE 4

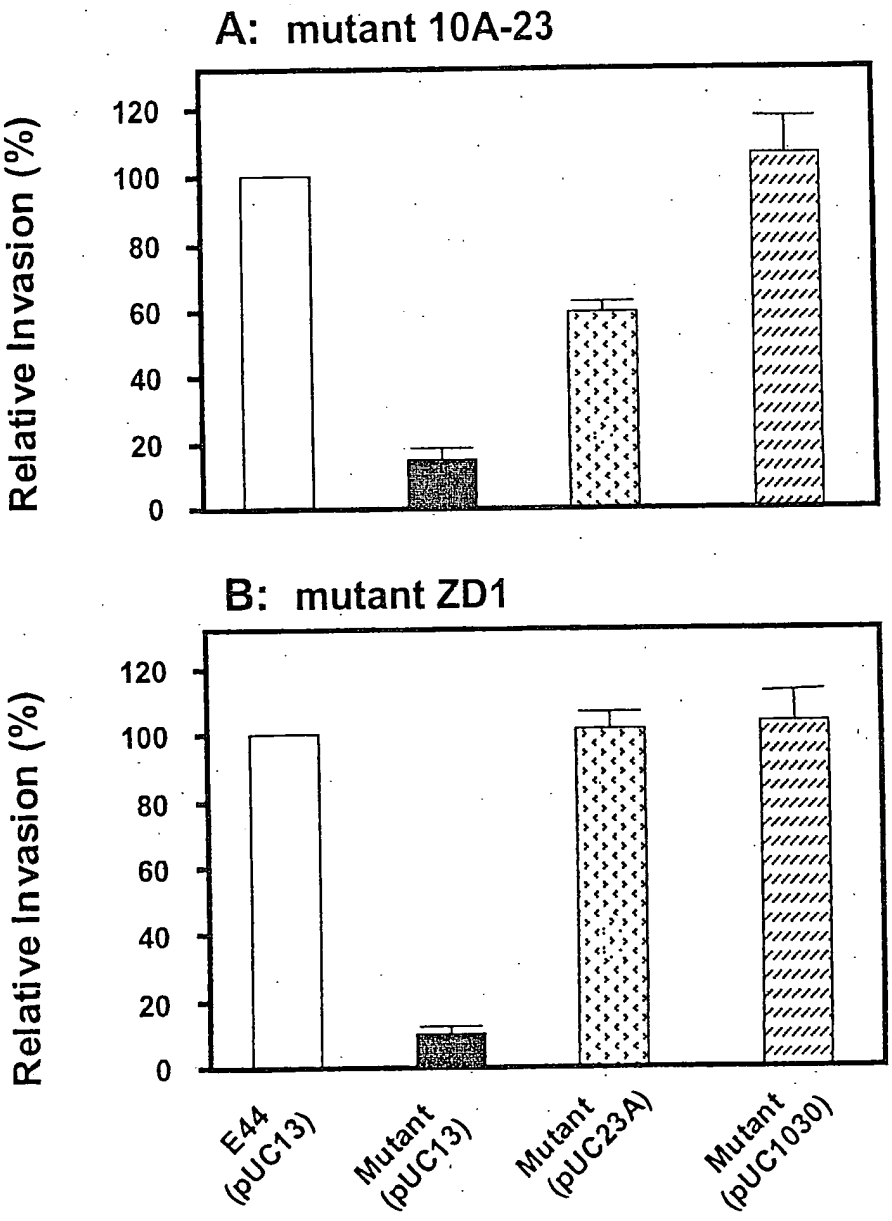

A: mutant 10A-23
Relative Invasion (%)
120
100
80
60
40
20
0
B: mutant ZD1
Relative Invasion (%)
120
100
80
60
40
20
0
E44 (pUC13)
Mutant (pUC13)
Mutant (pUC23A)
Mutant (pUC1030)

FIGURE 5

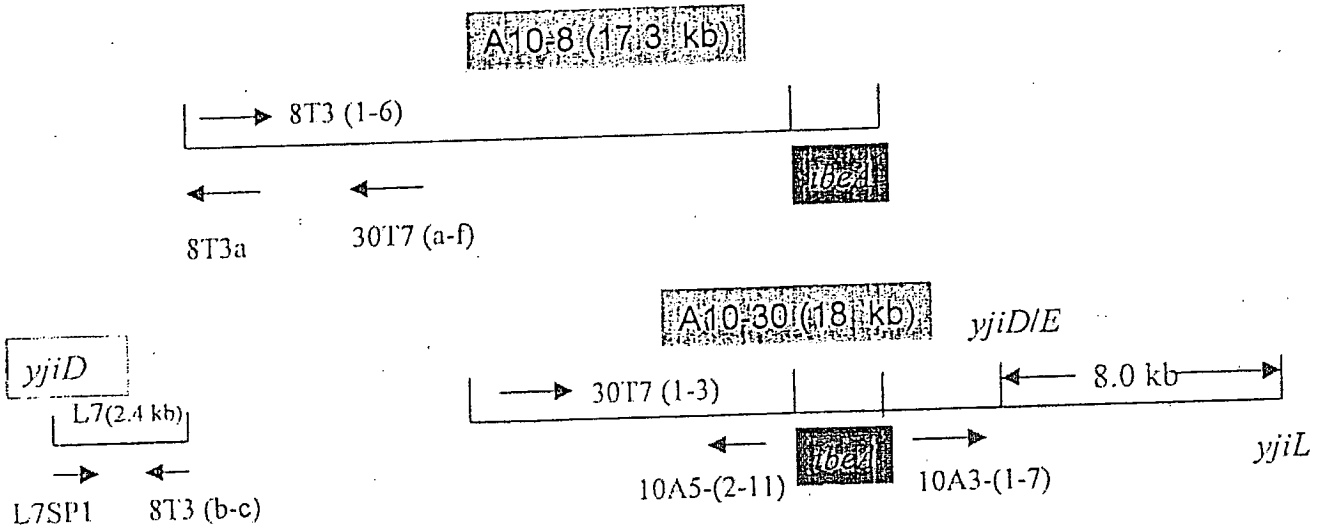

A10-8 (17.3 kb)
8T3 (1-6)
ibeA
8T3a
30T7 (a-f)
A10-30 (18 kb)
yjiD/E
yjiD
L7(2.4 kb)
30T7 (1-3)
8.0 kb
yjiL
10A5-(2-11)
ibeA
10A3-(1-7)
L7SP1
8T3 (b-c)

FIGURE 6

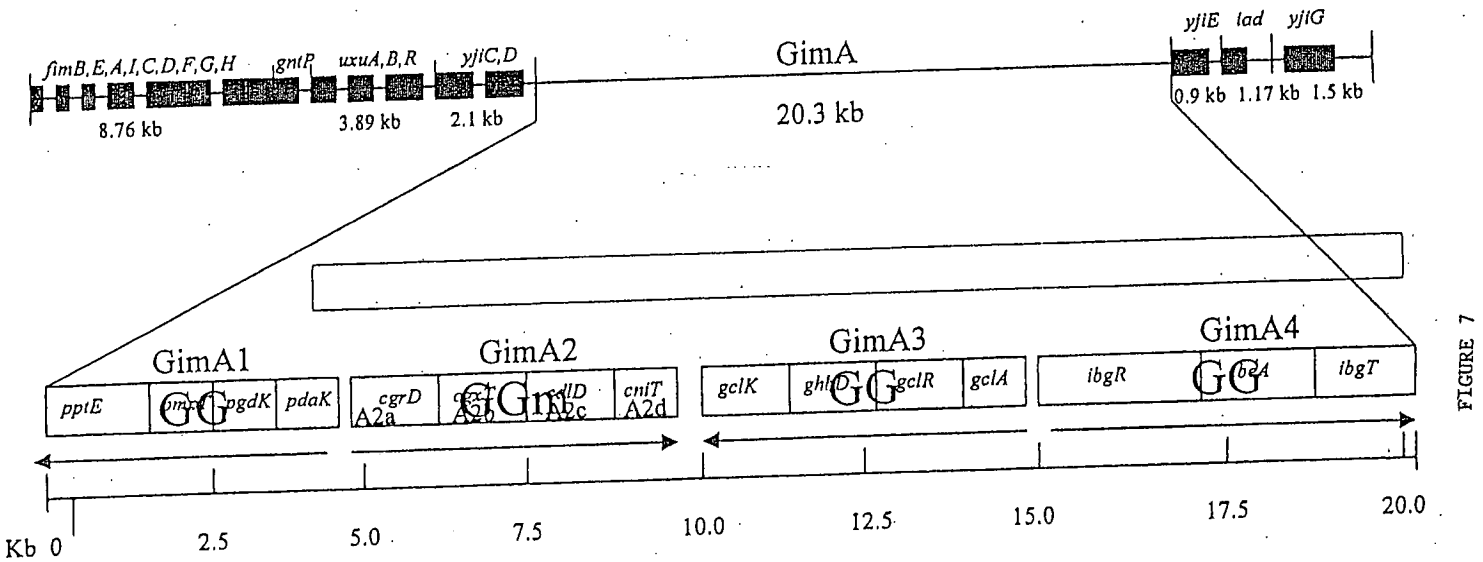

fimB,E,A,I,C,D,F,G,H
gntP
uxuA,B,R
yjiC,D
8.76 kb
3.89 kb
2.1 kb
GimA
20.3 kb
yjiE
lad
yjiG
0.9 kb
1.17 kb
1.5 kb
GimA1
GimA2
GimA3
GimA4
pptE
pgdK
pdaK
cgrD
A2a
A2b
A2c
A2d
cniT
gclK
ghlD
gclR
gclA
ibgR
ibgT
Kb 0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0

FIGURE 7

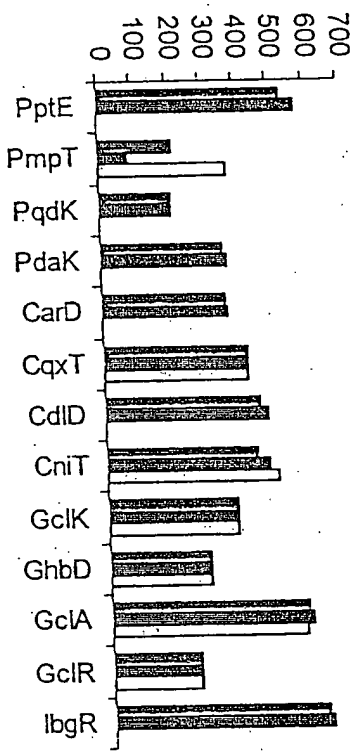
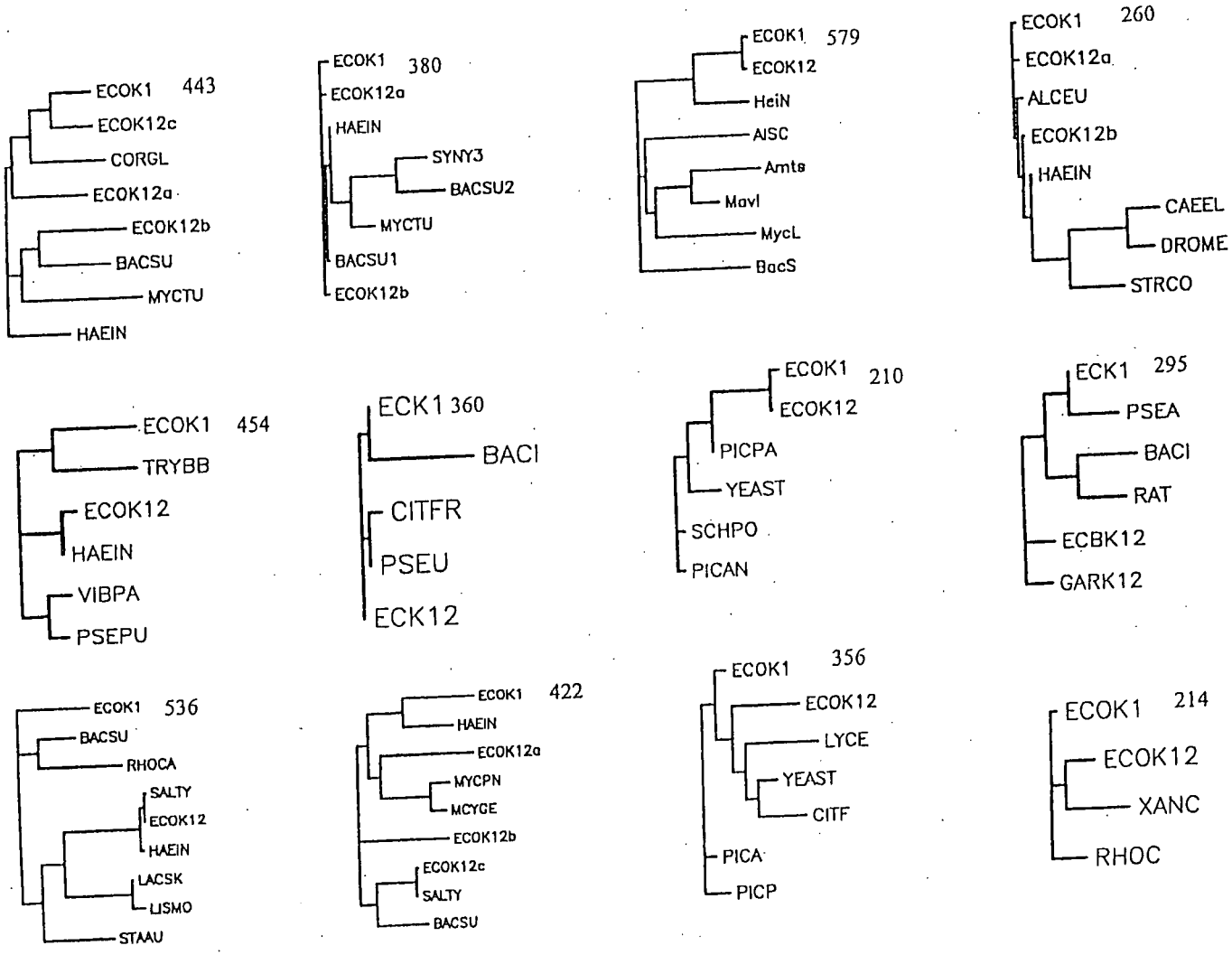

0
100
200
300
400
500
600
700
PptE
PmpT
PqdK
PdaK
CarD
CqxT
CdlD
CniT
GclK
GhbD
GclA
GclR
lbgR

FIGURE 8


ECOK1 443
ECOK12c
CORGL
ECOK12a
ECOK12b
BACSU
MYCTU
HAEIN
ECOK1 380
ECOK12a
HAEIN
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BACSU2
MYCTU
BACSU1
ECOK12b
ECOK1 579
ECOK12
HeiN
AISC
Amts
MavI
MycL
BacS
ECOK1 260
ECOK12a
ALCEU
ECOK12b
HAEIN
CAEEL
DROME
STRCO
ECOK1 454
TRYBB
ECOK12
HAEIN
VIBPA
PSEPU
ECK1 360
BACI
CITFR
PSEU
ECK12
ECOK1 210
ECOK12
PICPA
YEAST
SCHPO
PICAN
ECK1 295
PSEA
BACI
RAT
ECBK12
GARK12
ECOK1 536
BACSU
RHOCA
SALTY
ECOK12
HAEIN
LACSK
LISMO
STAAU
ECOK1 422
HAEIN
ECOK12a
MYCPN
MCYGE
ECOK12b
ECOK12c
SALTY
BACSU
ECOK1 356
ECOK12
LYCE
YEAST
CITF
PICA
PICP
ECOK1 214
ECOK12
XANC
RHOC

FIGURE 9

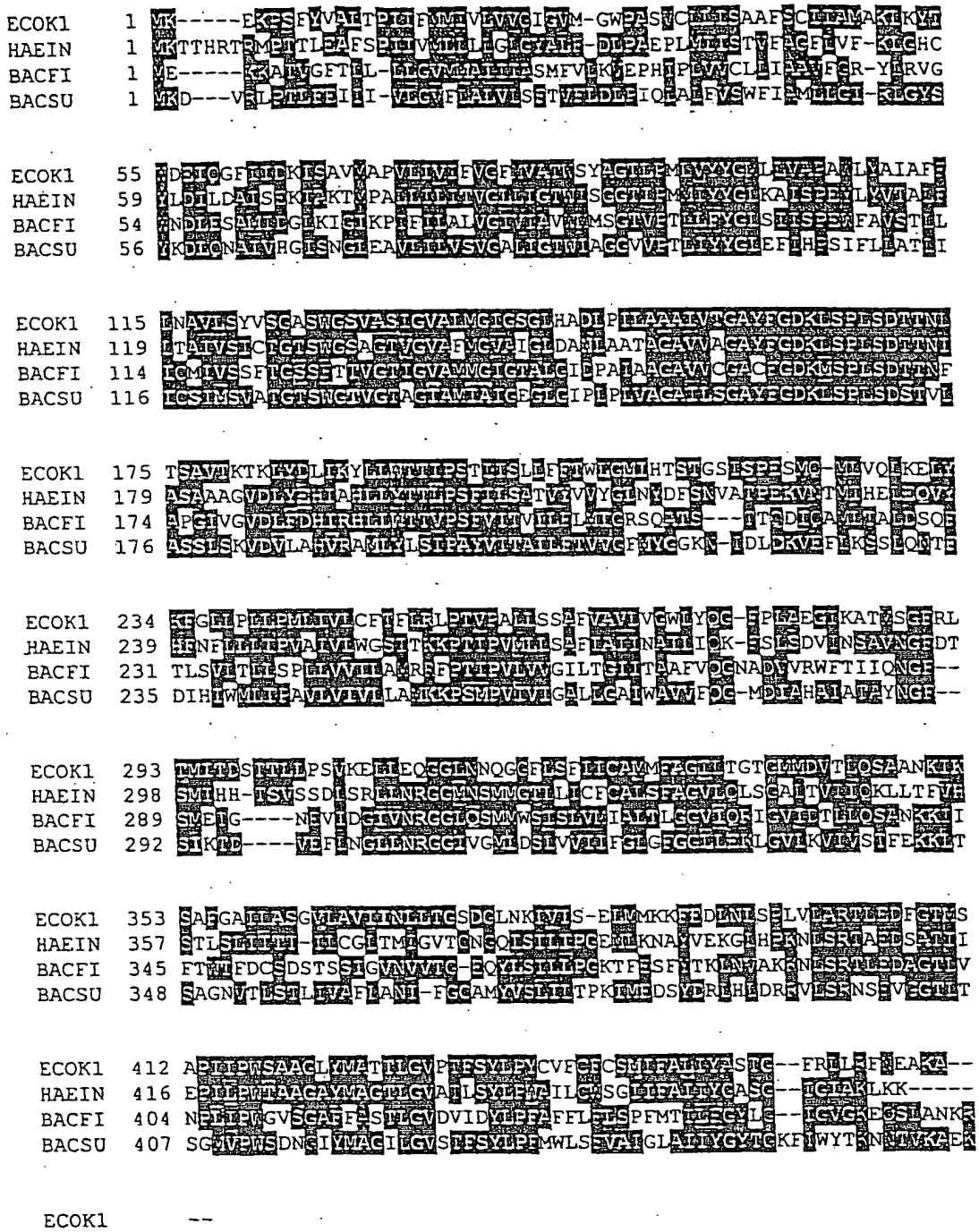

FIGURE 10

GimA-DNA

> GimA [org=Escherichia coli]

CAGAAGGGGAACTGGCATCGCACGATGCCGCAGTAAATGACGGGAAACGCGATACGCGCAAGACGTATCGCGTTAGGTCACAAT
TAGTGGGAGGCTCTGATTGCTGCTTTCAAGGCCGGAAGCCGGGACGGGCTGGCACTGAGCTTATCAATCCCCATGGTGAGCAGT
CGTGCTGTTTGCTGGGTATCTCCAGCCATTTCGCCGCACATACTGACCGGAATTTCATTATTACGTCCGGCCTGACACACCATA
GCAATAGCGTTAATCACCGCGTCATTACGATAATCGACCAGTTTCGCGACGGTGCTATTTCCTCTGTCTGCCGCCATAATATAT
TGCGTCAGATCGTTGGTGCCGATGGAAAAGAAATCGACTTCACTGGCTAATTTTTCTGCAACCATGACTGCAGCAGGAACCTCA
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ACCTCCTCGAGCGTTGAAACCATCGGCAGCATAATTTGCAACGTTGGGTATTCTTTCCCGGCCCGGAGAAGTGCGCGTAATTGC
GGAATAAATATTTGCGGATGCGCCAGGCACAACCGGATACCGCGAAGTCCCAGGAACGGGTTGTCCTCTGCGGGTAAAGGGTAC
GAAGGTAATGGCTTGTCACCGCCAATATCCAGAGTGCGGATGGTGACTGGTTTATCGCCAAAAGCCTGAGCAACAGAACAATAC
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CCGTGAGATAGCGCAGCCTCAATATCTTGCAGGTCACCAATATTCGCCAGCACGCTGATTTTTCGCCCACCTTGCGTGACAGCG
GGCAGCATGGCATCAGCTAACTGACGATCCCTTTGTTGCCGCCATGCTTCGGCGCGTTGCAGTAAATCTAGGCGGGTGACCTCA
TCCGGCTGTAGCCACAAACGGCCTGTTTCACCATCAAGAATGACCGTGTCGTTATCGCGGACGTTTTGCGGGGTAATAGCTGCC
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TCCGCCTGACAATATTGCTCTGCTAATGCCTGCATGACTTCTAACCATGCGAATTCCGCCTGTTTGCCCTTTGCCAGACGTTGC
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CAGGATGCTGGCTGCCGGACGAGCATGAATGCCGTGGGGATTACGTATCGTCCAGCAAAAAGTTTGCCATTCATCGCAATGATT
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AGAGCCAATCAGGCGTCAGGAAAAGCCACAATGGCAGGTGGGGCGTCGACACTGGCGGCACTGGCTATTGCCCGACTCTGTTAT
ACCACGCTACTGGAAGATGGCTATAAGGCAAAAGTCGCGGTTGAACAAGGTGTTAGCACCAAAGCGGTAGAGAATATTATCGAA

FIGURE 11A

GimA-DNA

GCTAATACCTATCTTAGCGGCATTGGATTTGAAAGTAGCGGCCTGGCGGCAGCTCATGCCATTCATAACGGCATGACGCAACTG
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CGACCTCATTGAATGAAAACATTCAGGAGACTGAAATGCACTATTTAAAAAAACGCTTTTCTTTGATTGAACTGAATGTGTTTA
TCCCAGCAATATTATTTATTGCGGTAATCATTCTGTGTTTGACGATATATCCACAAGATACCAGCCGGTATATAAATAAAATAC
ATCATTTTTTAACCTGGGAAATGGGCGGGATTTTTCTGGTCATGACTTTTCTGGTTGTACTTTGTTGTCTGTGGCTGGCCTTCT
CACGTTATGGCGATATCTTGTTAGGTCAGTCGGGAGAAAAACCTGACTTCAGCTTGTTAACCTGGCTTGGACTTATTTTTACTT
CTGGAACGGGGGGCAGCTTGTTATATCTGGCCTCTGTAGAGTGGATTTGGATCATTCAGCAACCGCCTTTTGGCGCAACAGCAG
GAAGCGCTCAGGCTGCTCGTTGGGCCTCTGTTTATGGCATGTTCCATTGGGGGCCGTCCGCATGGGCATGGTATTTGATTTGCG
CCGTTCCTATTGGTTGGTTTATGCATGTTAAGAAAACAAACTCATTAAAGGTCAGTGATTTATGTCGTGGATGTTTGGGAGCGC
GTGCGGATGGTTTTTGCGGGCATTGTGTGAATTTTTTCTACATGTTTGGTTTGCTCGGCGGCGCGGTAACGTCTCTGGCGCTGG
GAACGCCGATGATTTCTGCCGTATTTTGCCATGTGTTCCATCTGGATCCTGCCGGGCAGTTTATCAATGTCATGGTTATTTTTA
TCTGGACGCTAGTACCATTATTCATTCTCTTTTTTGGACTTAAAAAAGGTGTGGCATGGGCCAGTAACTGGAATATTCGTGCTG
ACATTTTGATGCTACTGGCAATACTGATTTGTGGACCAACGGCATTTATACTTAATCAATCAATTGATGGTCTCGGCCTGATGC
TGCAAAATTTTGTAGCGATGAGTTTAAGTACCGATGCTATTGGTCGTAGCGGATTTCCACAGATGTGGACCGTATTTTATTTTT
CATGGTGGGTCGTGTATGCCATCCCATTCGGTTTATTTATCGCCCGTATTTCAAAAGGAAGGACGATCCGGCAATTGATTGTAT
GTGGAACTCTGGCAGGTTCATTGGGATGCATGGTTTTTTACATGGTACTGGCTAATTTCGGCTTATCGTTGCAGACAACTCATG
TCATCGATTTTGTTCCCATACTTAACGAACAAGGGCGAGGCGTTGTCGTTTCTCGTTTACTGGAGCAGCTACCCGCAAGTCAGG
TGTTTTTGGTTGCTTTTGGGGCTATAGCATTAATTTCATATATTACCGGACACTGTACTGTGGGTTATGCCCTCGGTTTTGCGA
CGCAAAAACGGCCAGATAAGTAAAAGTGAACCGGCATTCTGGAACGTGGCATTTTGGTTGATTATGACTGGAATCGTCGCCATC
ACACTCTATCTTCTTGATGCGCAAAGTCTGCAACCGCTACAAACGGTGTCTATTCTGGCTGGACTACCGCTTTGCGGCGTGGTG
TTTATTTTATTGAAGAGTTTTTTGACGCAGCTTGCGGCTGAAGAGAAAAACGCGAGAGATGAATAATGATGTTCAGGAATGCCC
GGTAATTTGCATTATCGGGCATTTTACCGAACGGGAATTAACTCAGGATCGCACGAAAATATCCCGCCAGATTTTCTCCAAGAC
GAATTAAATTATTTTCTCCCTGACTCAGCGCGGTCGGTAAATTGCAAGGGCCGTTGACGACAGAAAAACAGGCTTCTATTCCAC
ACTGGCGTAACTCATTCAGATCAAGTTGATCATCGATATACCCGGCAATTGCGATAACCGGAACGCCCATCATCTGGGCAACTT
TGGCTGCGCCTACGGGCGCTTTGCCATTCAGGCTCTGACTATCTAATTTCCCTTCACCGACAATGGCCAATGCTGCGTATTTTA

FIGURE 11B

GimA-DNA

AATGTTGGGTATATTGAATCGCTTCCAGCACGAGCGAAATACCCGGTTGTAAGCGAGCATCGAGAAAAGCCATCAAGGCCGCGC
CAACGCCGCCAGCCGCCCCAGAACCGGGTATCGTATCGACGTCTTTACCACAACAACGGTAGATGCAACGGGCATAGTTTTTCA
TTCCCTGTTCCAGTTGCTCAAGGTCGTTAGCACTGGCCCCTTTTTGTTGAGCAAAAACCCGGGTCGCGCCGTTATCGCCGGTTA
GTGGGTTGGTGACATCACAGGCCGCAATAAATTTCACATTTTTCAATCGTGGATCGAGGTGCTGTAAGTCAATGTGGTGAATTG
CCGCCAGCCCCATCCCATTAACAGAGACTGATAGCCCTTCGGCGTCTGTAAACGATGCGCCAAGTGCCGACATCAACCCAATAC
CGCCATCATTTGTAGCACTGCCACCCAGGCATAGAATAACGGTATCAATATTGTGTTCCAGGGCGGCGAGAATAAGTTCGCCAG
TGCCAAACGACGTCGTATAAAGGGGAGAACGCTGGACAGGAGAAACCAGTTCCAGCCCTGAAGCTTGTGCCAGTTCTATCACTG
CGGTGGTTTGGTTGCCTAAAATACCGTATTGCGCATGTATTGATTCGCCAAGCGGTCCGGTGACTTTTTTAGTGTAAAACGTAC
CGTCAGTCGCATGAATGAGTGTTTCGAGCGTGCCTTCGCCGCCGTCAGCCACGGGCAAACACACCAGTTGGCTGCCAGGCAGGA
CCTTGCGCCAGCCGGTTGCCAGCGCTTCAGCGACTTTCCATGCGGGAAGGCATTCTTTAAAGGAGTCGGGGGAGATAACTATCT
TCATAGCAGGTCTCTCAAAATAGGGGAATGGGGCAGGGCAATGAGTGAACGAAGGGAACCGGTGGTTCCCTTAATTCATTATTT
ACGGATAGTGAAATTGGCTTGTGTTTCAAGCGCCCGAATTAACGCAGAATGATCCCACTCTTTACCACCGAGCGCGGCGCAGGC
GCTAAATAACTGCTGTGTCGTCGCCGTGTTAGGAAGCGGGGTATTCAACAGGCGGGCATTCTCCAGCGCCAGATTCAGATCTTT
TTGATGCAGACTAATACGAAAACCGGGTTCGAATGTTCCTTTTATCATCCGTTCGCCATGAACTTCCAGCACGCGAGAGGAGGC
TAACCCTCCCATCAGCGCTTCACGTACGCGGGCGGGATCGGCACCTGATTTACTGGCAAAGAGCAGGGCTTCAGCCACCGCTTC
AATATTCAGTGCAACAATAATTTGGTTAGCGACTTTGCACGTTTGACCATCACCGACGTTACCGACCAGAGTGATATTTTTACC
CATCAATTCCAGAATCGGTTTGATCTGCAAATAAACCTCTTCACATCCGCCAACCATAATGGAAAGCGTCCCGGCTTTCGCGCC
AACTTCACCGCCAGAGACGGGCGCATCGATATATTCCGCGCCTACCGCGATAATACGTTGTGCAAATGCTTTGGTGGCAACCGG
GGAAATTGAACTCATATCAATCACAATTTTCCCGTGGCTTAAACCGTGTATTACGCCATAGTTGGGATGAAAAAGAACATCCTC
AACATGTGGGGTATCAGGGAGCATGGTGATGATGACCTCACACTCCTGCGCGACTTCACGCGGTGTAGAGCAAACAATGCCACG
TTCACCAATAAACTCTTGCGGTGCAGGTTCAAAATGCGCTGAAAAATAAAGAGTATGTCCGGCTTGTTGTAAATTATAAGCCAT
CGGCTTACCCATTATGCCGGTGCCGATAAATCCAATATTCATGATAAATACCTCAGGGATTAAAATTGAGTCTCGTTTTTTAGC
CAGCGTAGACTTTCAGTCGTTGTCGTAGATGGAACATATTCGCAACCAATCCATCCCTGATAACCAATCTGGTCTATATAATTT
AACAACCACGGGTAATTAATTTCTCCCGTCCCTGGTTCATGACGCCCAGGGTTATCGGCTAATTGAATATGTTCAATGTTATTC
AGGTTGTTTTTGATTGTTGTAGCAATATTCCCTTCCATGATTTGCATATGATAAATATCGTATTGATAGCGAAAATCAGGATGA
TTTACATCATAAATAATATTGAGGGCTTGTCTGGTGTTGTTAACAAAAAAACCGGGAATATCTTTTGTATTAATGGCTTCCAGA
ACTAACTTTATGCCATGAGAAGCCAATTTATCTACTGCATAGCGCAAATTTTCGACCAGTGTTTCATGACATTGTTCATGCGAA
TAACCACCTGGATGTTTTCCTGCAAGGCAATTAACTTGTGAACAATTAAGGGCCTGGGCATATTCTATCGCTCTGCAAACACCC
TCCTGAAATTCTTTTGCCCGACTAGGATGACATGCAATACCCCGTTCACCCTCTTGCCAGTTACCCGCAGGAAGATTAAACAAA
ACCTGAGTCAGATTATGTTGATGCAGTTGCGAAGCCAGCTCGTCAGTGGAAAAGTCATAGGGAAAAAGATATTCAACGCCGTGG
AATCCTGCGTGACTTGCCTGCGCAAAACGTTCAATAAATGGATGCTCGGTAAAAAGCATTGATAAATTCGCTGCAAACTTTGCC
ATAATCCTGTTTCCTTATAAATCGAGAATTTCTTCAAATTCTGTGACTTTATTAATGTCAGGTCCCATAGCGATATTAGTCACG
CGTTCAGTAATAATTTCTACAACAACAGGTACGTGAAATTCGTCACGCAAACGCTGGGCTTCTTGCAGTGCAGGCGCAATATCC
TGTGATGCGAATACGCGAATCGCTTTACATCCTAATCCTTCAACCACAGCTTTATGATCAACGCCATAACCATTAATTTCTGGA
GCATTAATATTTTCAAATGACAGTTGAACGCAATAATCAATATCAAATGCACGTTGTGATTGACGAATCAAACCAAGATAAGCG
TTGTTAAGTAAAATATGGATATACGGAAGATTAAATTGTGCGCCGACGGCTAATTCTTCAATCAAGAATTGAAAATCGTAATCA
CCGGATATTGCCACAACGGGAACAGATGGATCAGCTTTTACCGCGCCCAGTGCTGCGGGCATTGTCCAGCCTAGCGGCCCAGCC
TGACAGGCATTAATCCAGTGGCGTGGGCGGTAAACATGTAAAAATTGGTTTGCGGCGATTTGCGCCAGACCAATTGTCGAAATA
TAGCGTGTCTCCGGTCCGAAAACCTTATTCATTTCGTGATACACGCGCTGCGGTTTAATTGGATTGCAGTCAAAGTCTGAACGA
CGAAGCATTGTGCGTTTACGCTCGGCACATTCGGCAATCCAGCGACTGCGGTCTTTCAGTTCTCCACGTGACTTCATATCACGG
GCGACCTGAATAAATAGCGTTAAGGCGCTTTCAGCATCAGAAACAATGCCCAGATCCGGCGCAAATATCCGGCCAATTTGTGCA
GGTTCGATATCAACATGAATGAATTTGCGGCCTTCGGTGTAGGTCTCAATGGCTCCGGTATGGCGGTTTGCCCAACGGTTACCG
ATACCAAAAACAAAATCTGAGGCCAGATAACTGGCGTTACCATAGCGATGACCCGCCTGACATCCCATGCGACCAATCATTAGG
GGGTGATCGTCTGATAAAGCGCCCCAACCGCGTAAGGTTTGAATGACGGGAACGCCAGTTAACTCGACAAACTCACGCAACAAT
TCACTCGCTTCGGCGTTAATAATGCCACCGCCAGCGATGATGACGGGCTTTTCGGCGTCATTTAGCATTTCTAATGCGCGTACG
GCCTGGGCCCGTGTTGCCTTAGGTTGCCAGGGGATTAGTGGCTGATAGAGATCGATATCAAACTCAATTTCGGTCATCTGAACA
TCAAAAGGGAGATCTAAAAGAACCGGGCCAGGGCGGCCTGAACGCATTTCCCAGAAGGCTTTCTGGAATATCCCCGGCAACTGA
CCCGCTTCGAGAATTGTGCGAGCCATTTTGGTTACTGGCGTGGCGATAGCCTCAATATCGACGGCCTGGAAATCTTCTTTATGA
AGTTTTCCTACGGGAGCTTGACCAGTAATGCAGAGAATAGGAATGGAATCCGCAGAGGCAGAATACAGCCCGGTAATCATATCA
GTGCCCGCAGGGCCTGATGTGCCAATACACACGCCAATATTGCCATTCTGACTGCGGGTGTAACCTTCAGCCATATGCGAGGCG
CCCTCAACATGACGGGCCAGAATATGATCAATACCGCCTGATTTTTTCATCGCGGCATAGAGTGGGTTTATTGCTGCGCCGGGT
ACACCAAAAGCAACGCTAATGCCTTCTTTTTTCAGTATTTCTACTGCAGCTTCGATTGCACGCATCCTCGCCATACATTATTTC
TCCTGATATTTACGCTGAGTTGAATAGTCAGTCAATTTTGGAATTTAACGATGAAATATCTTTGAGGAAATAAAAGGGCAGAAC
AAATTTCGCTGCACTGTTTCACAGTGAAACAACTCGTATGCCTGTGTTGTTTCAGTTTGAATAATTATAAATATCAAACGCAAA
GATTTCAGATGTTGTTGGCAGTTTTAAAATTTATCTAATGTATCATTCGTTTTTTATTGCTTTAACGGTTATTATTTCTAATGT
ATGTGTGATTACATTGTTGATAAGGTCTGTTTTTGTAATGATCCAGGCTAGATATTATTGCGTTTGATCAAGCTTACTGGCATA
GCATTCTGATACAAGTTCTGAAAATGACTTGAATGGATATTATTATAATGAATAAAGAGTCGTATCATAATGATCTAAAAAATA
AATGGAAAATGTTTGTTAAGCATGGTTGGGTCGCGACAAATTCGACTAATCATGTGATGCTGAGGTCATGGCAAAAATGTCTCA
AGCATTGTGACCCTCGCCACTGGAACACGCCTGTCAAAGCTTCCGGGCAAACATTGCAGACGATTTTTTCTCGTAACGAAGAGT
TTATTAGAATTTCACAAAGAGTTGTTGAAGACCATTTCACCCTGGCTGGTGACGACCGGTTGGCATTTTTGATCATTGATCCAC
ACGGCTGGGTTCTATCGTTGAATGCAGCAGGCGATTATTCCAGTCAATTGCGAGAGTTAGGAATTGAATCTGGTATGTCATGGG
CCGAAGATGGCATTGGAACCAATGTATATAGTCTTTGTCGGGAAACAAATTTATATACACAACTGGAAGGAGCAGAACATTTTA
GTGAACAGCTACATTGTTATGCGATGAGCGCTGCTCCGGTCATTGATTATTATGGTAATATACATGGATACATTGTATGTATAA

FIGURE 11C

GimA-DNA

TTGAAACCACCGCCGAGCTTGTTAAATTAAAAACATCATATTCATGTGCAACAGAAATCGCTAATTATATCTATATTGAGAATG
AACAAAAGTTAATAAACAAAGTACTTTGCCAGCATAATGCTGTGATTGAATGTATGGATGACGGTTTTATTTGTTGGAATAGTC
ATTCTTTAATTACGATGGTTAATTCTCAAGCACAAACATTACTGAATATTGATAAAGAAAGTTTAATTGGTCAGAACATCCGAA
AAGGATTCGTATTTCCGCCGATTTTGAATGAGGGAATTACACAACGAAACAAACTATCGCAAAAGCAAATTGTCCTCGAATGCC
GTGGCGAATTTATTGAACTTATGGTTACCCTTCGCCCGTTAAGCGATGGTTCGTTTTTGCTTTTTCTTCATCCATTAGACAAAA
TCAGGAAAATAGCCCAACAGCAAATAAGCACTAATGCAAATTTTACCTTTGACAGTTTACATGCGGCTTCAGGTGGTATGAAGC
AGGTATTACTTATCGCTCGCCGGGCAATTAAATCCATCTCTCCGATTTTGATCAATGGCGAAGAAGGTGTGGGAAAATTGAGTT
TGGCGATGGCAATACATAATGAGAGCGAGCAACGTGATGGGCCATTTATTTCTGTAGATTGTCAGATGCTATCACCAGAAAATA
TCTTACACGAACTTCTTGGCTCTGATGTTGGCCCTTCGCCATCGAAATTTGAACTGGCTCATAATGGCACCTTATATCTGGATA
AAGTCGAATATCTATCAGGGGAAGTTCAGAGTGTTTTATTGAAAGTATTGAAAACGGGGCTTGTTACTCGCTCAGACAGCCATC
GTTTGATCCCCGTACGCTTTCGTCTGATTACATGTACCAGTAGTTCTTTACGTGAGTACGTGCAACAAGGGGCTTTTAGCCGAC
AGCTATATTATGAGGTCTCCATGAATGAAATTGAAATTCCGCCATTGCGCAAACGTCGTGAAGATCTCAAGCAAATGATTGACG
ATATTATTGATAAGTATCAGGAGCGCACGCGAAAAAAAATGACAATCACGCCTGACGCAAATTCAGTTCTGCTTGAGTACCGTT
GGCCTGGGAACATCTCCGAGTTCAAAAATCGAATGGAGAAGGTATTTATTAACTGCAATCGACTTGTACTCGGGTTAGAGAATA
TTCCTCTGGATATCCGACAAAATAACAGTAGTGGCGACGATGATATCCCTCATCTTACTTCACTGGCAGAATTGGAGATGCAAG
CTATTGCGCATACATGTCGTGTCTGCGAATGGAATCTAACTAAAGCAGCTGAAGATTAAAAATTGGTCGTACAACATTATGGCG
CAAACTTAAGATCTATAATCTCTATCCAAATGTTGAGCATGCAGAATTGATGCGTTTTCAAATTGAAAGAATTTAATATCGCAG
TGTTTCATTTTGATGCAGTGCTTTAATGGTATTGAAATATTGTGATGTGCTCCATAAATGCCCAATGTGGTTATTAGCCAGGGA
GACGGAAAATGTGTTTACACTCCCTGAAATAATAAAAAACAGGCAAAGAGAGATGATCTCCCTTGTATGTCTGTATTAGCATGA
TGTTGCTTGTTAATAATTAAAAATATCAACGCGCTTATATAAGCGCGGGGGATTGTTTTACTCAATTATTGAATACGGAGATAA
AGTATGGAATTTTATCTGGAACCCGCTCGTAATATACCTGTACTGGCAACCACGGAAGTGTTAGTTGTTGGTGGTGGTCCATCG
GGTATTGCCGCAGCAATGAGTGCCGCTCGTGAAGGCGCAGCTACTATGCTGATTGAACGTTTCGGTTGTTTTGGCGGAATGATG
ACAACGGCTGGCGTCGAGTCAATTGCCTGGTGGCGTCATGAAAATACGGTAGAGTCAGGTGGACTGGCACGCGAAATAGAAGAA
ACGGCAAAATCAATGGGGGCGTCCAGCCCTGAGCCGCAATCGAATAGTCAGGCTATTAACGAAGAGCGTTTCAAACTGGTTGCG
GATGCAATGCTTGAACAGGCAGGTGTGCGCCGCGTACTACACATTACCGCCGTTGATGTTATCAAGCAGGGCAATAATTTACTC
GGCGTAATAACAGAGAGTAAATCTGGTCGTCAGGCTATTTTGGCAAATGTCATTATTGACTGTACTGGTGATGCTGATATTGCA
TGGTTTGCCGGAGCACCATTTATTAAGCGTGAACGCGAAGAGCTAATGTGTATGACAACCGTTTTTAGTTGCGCAAATATAAAT
AAAAACGCGTTCATGCAAAATATTAATAGCACGGAACCTAAATATGGAGACTGGGGGGCGGATGAAGAAAATAAAAACTGGTCT
TATGATGTTCATGAATCTTGTCGCGATATGTTTAGCCCTTATCTGGGTAAAGTCTTGCGAAAGGAAAGGTCGGCAGGAATTATT
CCAAAAGATGTGACGTTAGGCGGTTCCTGGAGTACGGTCACCGAGTATGGTGATGCGAATTACTTGAACGTTGTCAGCATCCCT
GCCGTCGATTGTACGGATGTTTTTGACCTGACGCGTGCAGAAATAGAAGGCCGCAAGCAAGCCATGCAGGCGATTGAAGCGTTG
CGTCAATTCCAGCCAGGATTTGAACAGGCACAATTAAAAAATTTCGGTATGACGGTGGGAACAAGAGAATCAAGACATATTATT
GGGCGAGTCCAGCTTACGGAAAATGATATTTGTAATGAGGGACGTCATGCGGATTCAATAGGGGTATTCCCTGAGTTTATAGAT
GGAAATGGTCATCTTAAATTACCTCTTGAAGCGAACTATTTTCAAATCCCTTATGGCGTAATGATTCCGCAGCAAGTTGAAAAC
CTGTTGGTTTGCGGACGGGCAATCGATGCAGATAATTTCGCCTATGCGACAATCCGTAATATGGGGTGTTGTATGGTCACTGGA
GAAGGTGCAGGGACTGCCGCTGCTATTGCCATTAAAAATAACACTACCGTTTCACAGGTAGATATTCAGACGGTACAGGAACGC
TTACAGCAAAATGGCGTAAAAGTCTTTTAACAGGGAATAAAGTTATGAAAGAAAAACCCAGTTTTTATGTCGCGCTTACACCGA
TCATTTTTATGATGATCGTGTTGGTTGTTGGCATCGGTGTTATGGGCTGGCCTGCCAGCGTCTGTTTATTAATTTCAGCGGCGT
TTTCCTGCATTATTGCAATGGCTAAGCTGAAATATACCTGGGATGAAATCCAGGGGTTTATTATCGATAAAATTTCGGCGGTGA
TGGCACCGGTACTTATCGTTATTTTCGTTGGCTTTATGGTCGCGACATGGAGCTATGCAGGTACACTGCCGATGCTGGTTTATT
ACGGTATGTTACTGGTTGCGCCCGCATGGCTTTATGCCATAGCGTTTTTTCTGAACGCAGTATTGTCCTATGTTTCCGGGGCAT
CATGGGGATCTGTCGCTTCTATTGGTGTTGCATTAATGGGCATCGGTTCCGGCTTACATGCCGATCTTCCAATTCTGGCGGCAG
CCATTGTTACCGGGGCTTATTTTGGCGACAAACTTTCACCGTTAAGTGATACCACCAACCTGACTTCAGCGGTAACCAAAACTA
AACTTTATGATCTGATTAAATATCTACTCTGGACGACCATCCCATCAACGATTATTAGCCTGCTGTTTTTTACCTGGCTGGGAA
TGATTCATACTTCTACGGGCTCTATTTCACCAGAAAGCATGCAGATGCTGGTACAGCTCAAAGAGTTATATAAGTTTGGTCTGT
TACCGCTACTGCCTATGCTTATTGTTCTGTGCTTTACCTTTTTGCGTTTGCCTACAGTACCGGCATTATTAAGCAGTGCGTTCG
TGGCCGTATTGGTTGGATGGCTGTATCAAGGTTTCCCGCTGGCCGAAGGTATTAAGGCCACAATGAGTGGTTTCCGTCTGACGA
TGATCACTGATTCAACGACGCTGTTACCTTCTGTGAAAGAACTGCTTGAACAAGGCGGCCTGAATAATCAGGGCGGATTCCTGT
CATTTATTATCTGCGCCATGATGTTTGCTGGCATCCTGACGGGAACAGGAATGATGGATGTCACATTACAAAGTGCGGCAAACA
AAATAAAAAGTGCTTTTGGCGCTATTCTGGCAAGTGGTGTTTTAGCGGTCATCATTAACTTGCTTACCGGTTCTGATGGTTTGA
ATAAGATTGTTATATCTGAATTGATGATGAAGAAATTCGAAGATCTTAATTTATCTCCATTAGTTTTAGCCCGAACGCTGGAAG
ATTTTGGCACCATGAGTGCGCCAATAATTCCGTGGTCAGCCGCCGGATTGTATATGGCGACGACGCTAGGTGTTCCGACGTTTA
GTTACCTGCCGTACTGTGTATTCTGTTTCTGCTCGATGATATTTGCGTTGATCTATGCTTCTACAGGTTTCCGTTTACTGCGCT
TCAACGAAGCAAAGGCCTGAGTTATTCAAGATAATAAATGCGTTTGCCGGATGGATTAATCTCCATCCCGCGTTAATGTCAAAA
TTCCATGTTCTGCAGAAT

FIGURE 11D

GimA-Proteins

PgdK (GimA1)

MKIQNKHVIAWLESCAAHLTEQQDFLTALDRDIGDADHGLNMNRGFSAVKATLPDIERQHIGNILKNTGMKLLSSVGGASGPLY
GTLFIRASAAVGARTELTLEEWLACLEEGIAGVIARGKAEQGDKTLCDVWVPVLHEAKKNLQAGMSPSLLLNTMVQDAATAVDN
TINMQAKKGRASYLGARSVGHQDPGATSSWLMIKAMQEGFAG

PptE (GimA1)

VVSAPVDGAISGLSVQNGIAIGPVKWFTCERPEITQRTVDSPQEELSRIESAIDIVVCELADKAAGPEGDIFAAHKMMLEDPEI
NRQLQQRLAKGKQAEFAWLEVMQALAEQYCQAETLYLREREADIRDLTRQVLNQLCGVSEQHFITTAPCILLANDLLPSQITSL
NKAHILGICLHNGGTTSHTAILARAMGIPAIVKAAITPQNVRDNDTVILDGETGRLWLQPDEVTRLDLLQRAEAWRQQRDRQLA
DAMLPAVTQGGRKISVLANIGDLQDIEAALSHGAEGVGLLRTEFLFHESATLPDEEEQFRVYCSVAQAFGDKPVTIRTLDIGGD
KPLPSYPLPAEDNPFLGLRGIRLCLAHPQIFIPQLRALLRAGKEYPTLQIMLPMVSTLEEVNAVKTLIQTQAKLLGLTAENLPA
LGIMIEVPAAVMVAEKLASEVDFFSIGTNDLTQYIMAADRGNSTVAKLVDYRNDAVINAIAMVCQAGRNNEIPVSMCGEMAGDT
QQTARLLTMGIDKLSASPSRLPALKAAIRASH

PmpT (GimA1)

MVAIVIVSHSLRLAQGVEELALQMSGGDVPLAIAAGIDDPQNPIGTDAIAIMSAIESVWSPDGVLVLMDMGSALLSTEMALELL
SEEQRSAIYLLAAPVVKGAMSAVTSAAAGLSVTEIIAEVDLALCAKQQQLTPSSTAGEVIPVISPVNHCDEWQTFCWTIRNPHG
IHARPAASILKVSARYSANIIVIKGDKRASTRSLNELAMLGVRLWR

PdaK (GimA1)

MTMKKLINQIDSVVTEQMEGLIATWPHLQANYAPRYVWCKQTDNAVALISGGGSGHEPLHAGFVGMGMLTGACPGEIFTSPTPD
QMIECAKAVDNGSGVLFFIKNYTGDILNFETAVEMLHEEGIAVGTVIIDDDVAVKDSLYTAGRRGVAGTVFVEKIVGAAALQGY
NLGQCEQLGKDVNNATRSFGIALSACTVPAAGKPSFELADNEIEFGVGIHGEPGIERRTLQDLNTLIDSVIAQLLDNTPWRRTL
RHWDRHAGGWIDASSMNESFDQNAEYIVLINGLGSTPESELYGVARVFMCAAQRQGIKISRQLVGNYCTSLDMAGFSISLLKCT
PEFLQLWDAPVNTPALRWGC

CgrD (GimA2)

MDKIIISPAKYIQGNGSLDNIATYAASLGTEPLIIADEFVTGLVGDRVSQSFARENIIADFDVFCGECSQNEISRIRKKFNQRK
YNVVIGIGGGKTLDTAKAVAYYQKIPVVVVPTIASTDAPTSSLAVIYTPDGQFSEYLFFPKNPDMVIMDTGVISAAPVRLLVAG
MGDALSTWFEARANQASGKATMAGGASTLAALAIARLCYTTLLEDGYKAKVAVEQGVSTKAVENIIEANTYLSGIGFESSGLAA
AHAIHNGMTQLEECHHCYHGEKVAFGVLVQLVLENAPQEEIETVLNFCHSVGLPTNLHMLGVKEINKDKLRAVAKAATAEGETI
HNMPFVVTAQDVLCAILTAHHLGL

CgxT (GimA2)

MTSNWKRWITLALCGIAGSAIYKLPYLRETYYDAMQQATGATNAELGFLMTAYGLVNFLLYLPGGWAADRFSARKLMTFSLIST
GISGFYYATFPSYTMICLLHALWAVTTVFTFWAVCVRIIRTLGTSEEQGRLYGYWFLGKGLTSIVLGFLSVPVFAKFGEGVDGL
RATIIFYSVVTILAGVLAWFVCQDETHSEDKANFRLADMAFVLKMPTVWLAGVVTFCMWSIYIGFGMVTPYLTQILHMGESEVA
VASILRAYVLFAMGGLIGGQLADRCASRTRFMIYAFIGMIVFTTVYFFLPGESRYVTIALANMVALGVFIYSANAVFFSIIDEV
RIPAKVTGTAAGLISLLTYFPEIYCYTMVGNMVDRKPGIAGYQDVFLFMLVCAFIGLIAALVLQRVNRKSKNQVNEITQNNADC
AS

CdlD(GimA2)

MVDMINESARQTPVIAQTDVLVIGGGPAGLSAAIAAGRLGARTMIVERYGSLGGVLTQVGVESFAWYRHPGTEDCEGICREYEG
RARALGFTRPEPQSISEVIDTEGFKVVADQMITESGVEPLYHSWVVDVIKDGDTLCGVIVENKSGRGAILAKRIVDCTGDADIA
ARAGAPWTKRSKDQLMGVTVMFSCAGVDVARFNRFVAEELKPTYADWGKNWTIQTTGKEDPMFSPYMEDIFTRAQQDGVIPGDA
QAIAGTWSTFSESGEAFQMNMVYAFGFDCTDVFDLTKAEIAGRQQALWAIDALRHYVPGFENVRLRNFGATLGTRESRLIEGEI
RIADDYVLNQGRCSDSVGIFPEFIDGSGYLILPTTGRFFQIPYGCLVPQKVENLLVAGRCISAGVVAHTSMRNMMCCAVTGEAA
GTAAVVSLQQNCTVRQVAIPDLQNTLQQQGVRLA

CniT (GimA2)

MHYLKKRFSLIELNVFIPAILFIAVIILCLTIYPQDTSRYINKIHHFLTWEMGGIFLVMTFLVVLCCLWLAFSRYGDILLGQSG

FIGURE 12A

GimA-Proteins

EKPDFSLLTWLGLIFTSGTGGSLLYLASVEWIWIIQQPPFGATAGSAQAARWASVYGMFHWGPSAWAWYLICAVPIGWFMHVKK
TNSLKVSDLCRGCLGARADGFCGHCVNFFYMFGLLGGAVTSLALGTPMISAVFCHVFHLDPAGQFINVMVIFIWTLVPLFILFF
GLKKGVAWASNWNIRADILMLLAILICGPTAFILNQSIDGLGLMLQNFVAMSLSTDAIGRSGFPQMWTVFYFSWWVVYAIPFGL
FIARISKGRTIRQLIVCGTLAGSLGCMVFYMVLANFGLSLQTTHVIDFVPILNEQGRGVVVSRLLEQLPASQVFLVAFGAIALI
SYITGHCTVGYALGFATQKRPDK

GcxK (GimA3)

MKIVISPDSFKECLPAWKVAEALATGWRKVLPGSQLVCLPVADGGEGTLETLIHATDGTFYTKKVTGPLGESIHAQYGILGNQT
TAVIELAQASGLELVSPVQRSPLYTTSFGTGELILAALEHNIDTVILCLGGSATNDGGIGLMSALGASFTDAEGLSVSVNGMGL
AAIHHIDLQHLDPRLKNVKFIAACDVTNPLTGDNGATRVFAQQKGASANDLEQLEQGMKNYARCIYRCCGKDVDTIPGSGAAGG
VGAALMAFLDARLQPGISLVLEAIQYTQHLKYAALAIVGEGKLDSQSLNGKAPVGAAKVAQMMGVPVIAIAGYIDDQLDLNELR
QCGIEACFSVVNGPCNLPTALSQGENNLIRLGENLAGYFRAILS

GcxR (GimA3)

MNIGFIGTGIMGKPMAYNLQQAGHTLYFSAHFEPAPQEFIGERGIVCSTPREVAQECEVIITMLPDTPHVEDVLFHPNYGVIHG
LSHGKIVIDMSSISPVATKAFAQRIIAVGAEYIDAPVSGGEVGAKAGTLSIMVGGCEEVYLQIKPILELMGKNITLVGNVGDGQ
TCKVANQIIVALNIEAVAEALLFASKSGADPARVREALMGGLASSRVLEVHGERMIKGTFEPGFRISLHQKDLNLALENARLLN
TPLPNTATTQQLFSACAALGGKEWDHSALIRALETQANFTIRK

GclA (GimA3)

MARMRAIEAAVEILKKEGISVAFGVPGAAINPLYAAMKKSGGIDHILARHVEGASHMAEGYTRSQNGNIGVCIGTSGPAGTDMI
TGLYSASADSIPILCITGQAPVGKLHKEDFQAVDIEAIATPVTKMARTILEAGQLPGIFQKAFWEMRSGRPGPVLLDLPFDVQM
TEIEFDIDLYQPLIPWQPKATRAQAVRALEMLNDAEKPVIIAGGGIINAEASELLREFVELTGVPVIQTLRGWGALSDDHPLMI
GRMGCQAGHRYGNASYLASDFVFGIGNRWANRHTGAIETYTEGRKFIHVDIEPAQIGRIFAPDLGIVSDAESALTLFIQVARDM
KSRGELKDRSRWIAECAERKRTMLRRSDFDCNPIKPQRVVYHEMNKVFGPETRYISTIGLAQIAANQFLHVYRPRHWINACQAGP
LGWTMPAALGAVKADPSVPVVAISGDYDFQFLIEELAVGAQFNLPYIHILLNNAYLGLIRQSQRAFDIDYCVQLSFENINAPEI
NGYGVDHKAVVEGLGCKAIRVFASQDIAPALQEAQRLRDEFHVPVVVEIITERVTNIAMGPDINKVTEFEEILDL

GhyI (GimA3)

MAKFAANLSMLFTEHPFIERFAQASHAGFHGVEYLFPYDFSTDELASQLHQHNLTQVLFNLPAGNWQEGERGIACHPSRAKEFQ
EGVCRAIEYAQALNCSQVNCLAGKHPGGYSHEQCHETLVENLRYAVDKLASHGIKLVLEAINTKDIPGFFVNNTRQALNIIYDV
NHPDFRYQYDIYHMQIMEGNIATTIKNNLNNIEHIQLADNPGRHEPGTGEINYPWLLNYIDQIGYQGWIGCEYVPSTTTTESLR
WLKNETQF

IbgR (GimA4)

MDIIIMNKESYHNDLKNKWKMFVKHGWVATNSTNHVMLRSWQKCLKHCDPRHWNTPVKASGQTLQTIFSRNEEFIRISQRVVED
HFTLAGDDRLAFLIIDPHGWVLSLNAAGDYSSQLRELGIESGMSWAEDGIGTNVYSLCRETNLYTQLEGAEHFSEQLHCYAMSA
APVIDYYGNIHGYIVCIIETTAELVKLKTSYSCATEIANYIYIENEQKLINKVLCQHNAVIECMDDGFICWNSHSLITMVNSQA
QTLLNIDKESLIGQNIRKGFVFPPILNEGITQRNKLSQKQIVLECRGEFIELMVTLRPLSDGSFLLFLHPLDKIRKIAQQQIST
NANFTFDSLHAASGGMKQVLLIARRAIKSISPILINGEEGVGKLSLAMAIHNESEQRDGPFISVDCQMLSPENILHELLGSDVG
PSPSKFELAHNGTLYLDKVEYLSGEVQSVLLKVLKTGLVTRSDSHRLIPVRFRLITCTSSSLREYVQQGAFSRQLYYEVSMNEI
EIPPLRKRREDLKQMIDDIIDKYQERTRKKMTITPDANSVLLEYRWPGNISEFKNRMEKVFINCNRLVLGLENIPLDIRQNNSS
GDDDIPHLTSLAELEMQAIAHTCRVCEWNLTKAAED

IbgT (GimA4)

MKEKPSFYVALTPIIFMMIVLVVGIGVMGWPASVCLLISAAFSCIIAMAKLKYTWDEIQGFIIDKISAVMAPVLIVIFVGFMVA
TWSYAGTLPMLVYYGMLLVAPAWLYAIAFFLNAVLSYVSGASWGSVASIGVALMGIGSGLHADLPILAAAIVTGAYFGDKLSPL
SDTTNLTSAVTKTKLYDLIKYLLWTTIPSTIISLLFFTWLGMIHTSTGSISPESMQMLVQLKELYKFGLLPLLPMLIVLCFTFL
RLPTVPALLSSAFVAVLVGWLYQGFPLAEGIKATMSGFRLTMITDSTTLLPSVKELLEQGGLNNQGGFLSFIICAMMFAGILTG
TGMMDVTLQSAANKIKSAFGAILASGVLAVIINLLTGSDGLNKIVISELMMKKFEDLNLSPLVLARTLEDFGTMSAPIIPWSAA
GLYMATTLGVPTFSYLPYCVFCFCSMIFALIYASTGFRLLRFNEAKA

FIGURE 12B

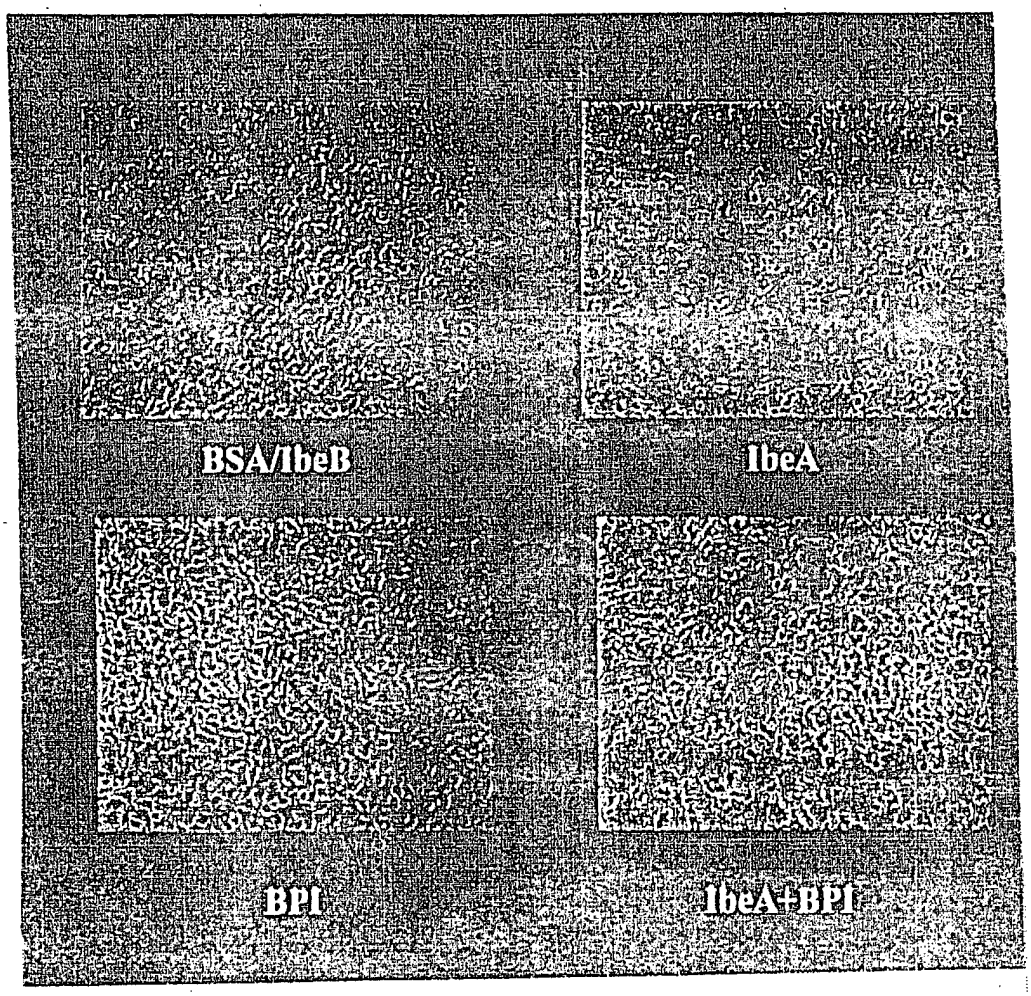

FIGURE 13